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(58) Field of search

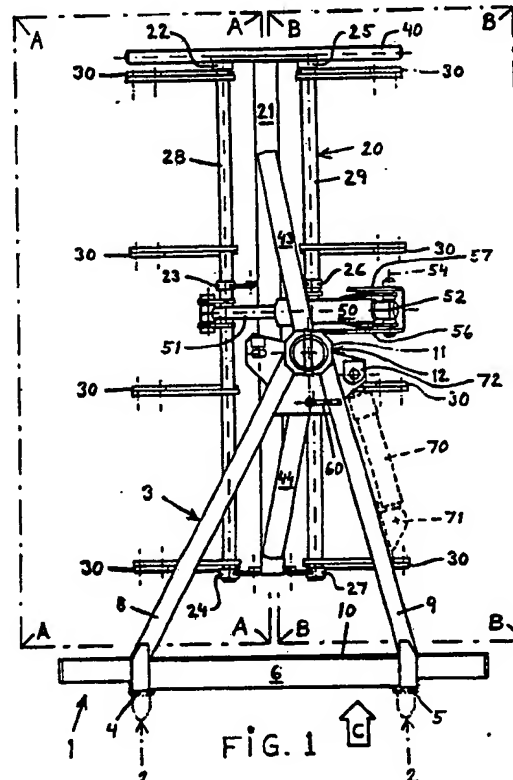
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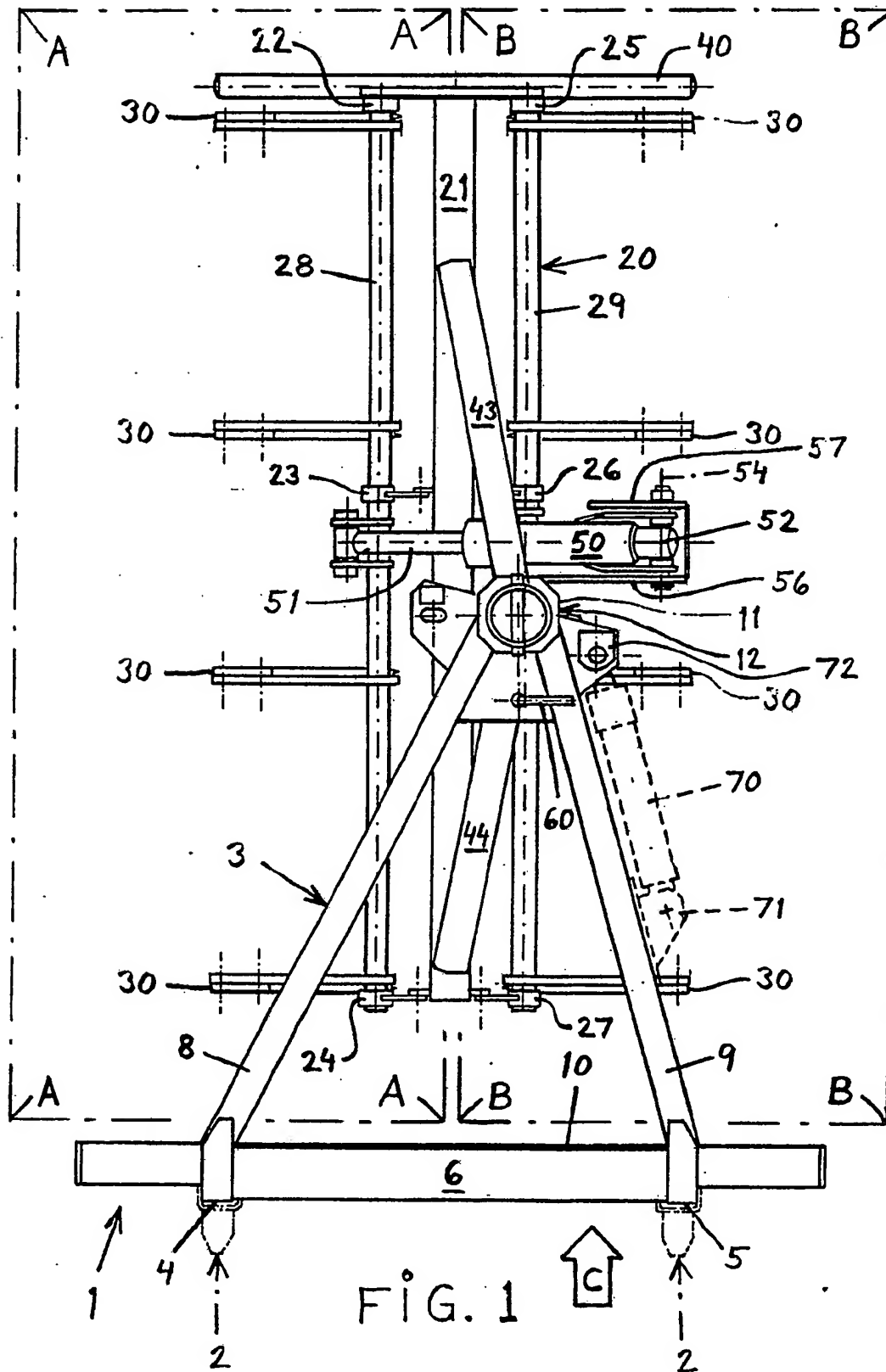
## (54) Bale handling device

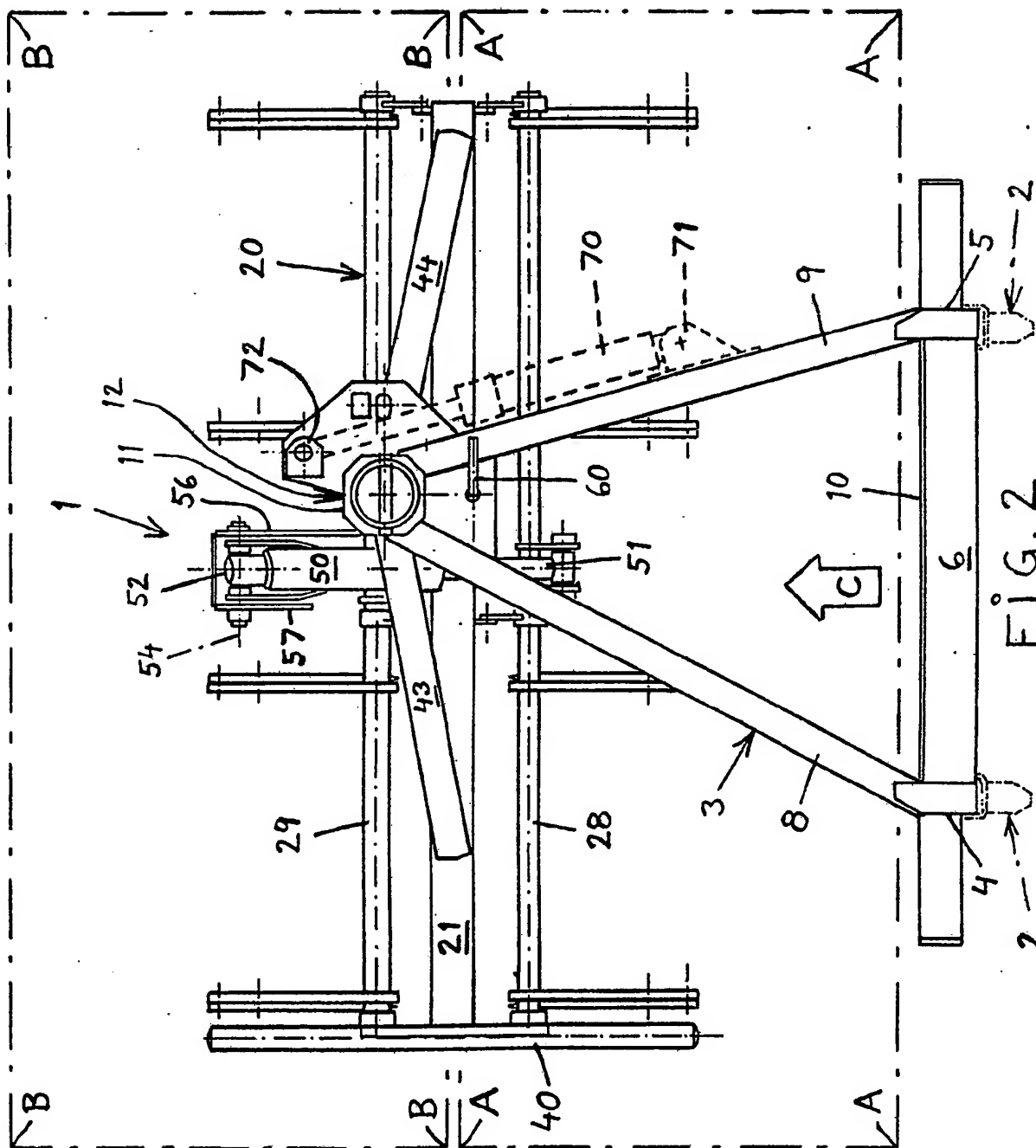
(57) A device (1) for handling bales, particularly for crosswise piling, is intended to be mounted on a vehicle. The device (1) comprises a framework (3) connectible with the vehicle and a grab unit (20) supporting grab arms (30), said grab unit being rotatably connected to the framework (3) about a vertical axis. The arms (30) are fixed to two rods (28, 29) which are rotatable by means of a hydraulic ram 50 to move the arms between raised positions and lowered positions, in the of which they penetrate the bales (A,B). The framework may be either manually rotatable about the vertical axis or rotatable by a hydraulic ram (70).



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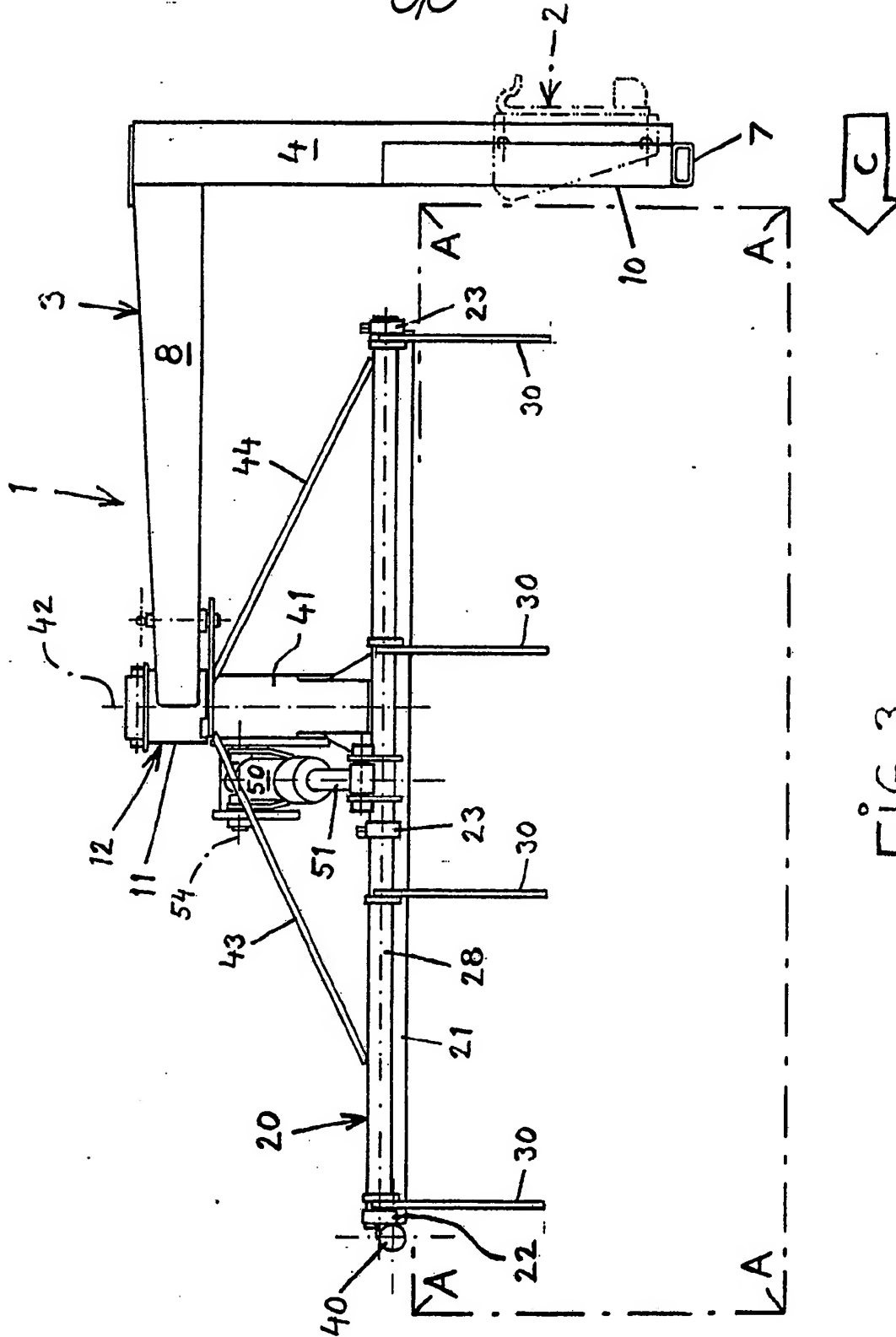
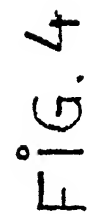


FIG. 3



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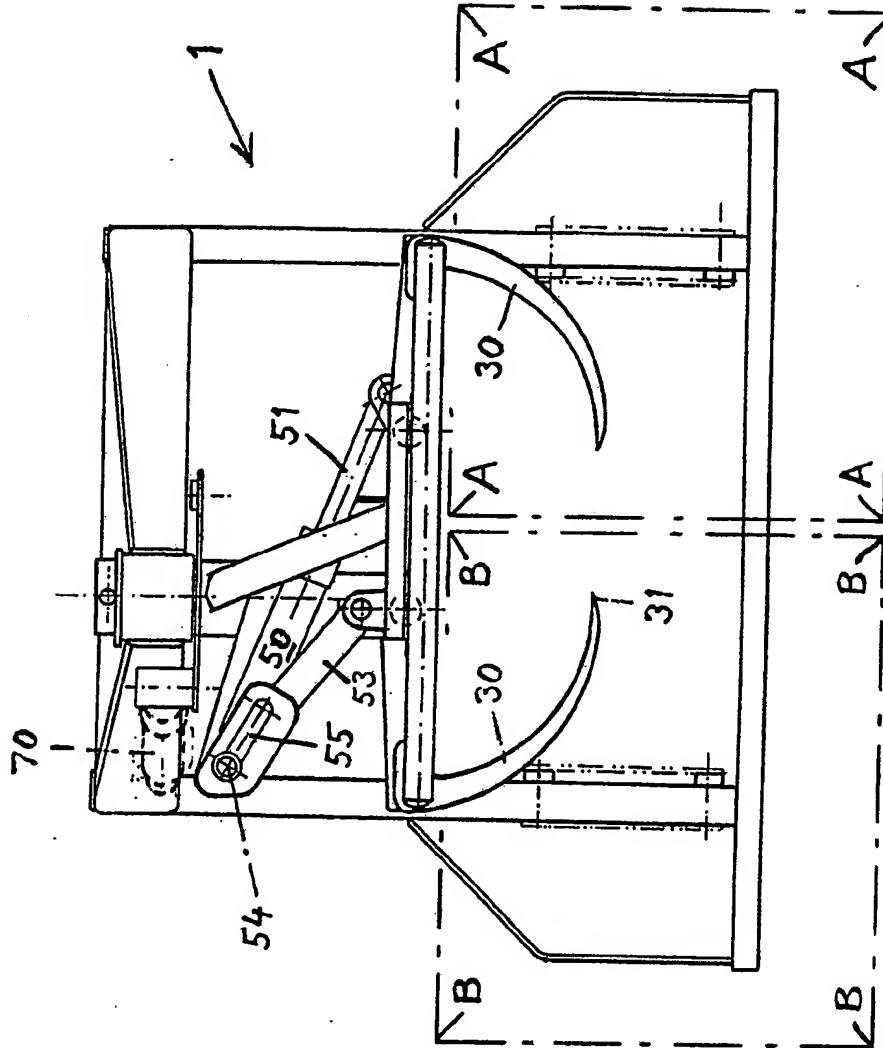


FIG. 5

This invention relates to a device for handling bales etc. which is intended for mounting on a vehicle and to be supported by this, said vehicle having means for moving the device at least vertically relative to the vehicle, said device comprising movable means for grabbing the bales so that these accompany the device when this is moved by means of the vehicle.

When handling so-called bales of for instance hay, straw or another penetrable material bale handling devices, so-called bale grabs, are used which are supported by for instance an agricultural tractor provided with a front loader. It is meant here by front loader a system of levers mounted on the tractor which has motion characteristics enabling tilting manoeuvres as well as raising and lowering the device when this is mounted on the front loader.

So-called bale compression devices are found on the market which provide bales of a relatively great length in comparison with their cross-section which is usually rectangular or square. When such oblong bales are to be piled upon each other in various connections it is preferred to pile such bale layers in crosswise manner to obtain a good stability of the pile built of bales in this way.

To be able to perform this crosswise piling by loading of bales from the same direction it must be possible to pick out and handle bales by means of the bale handling device both when the bales are in such a position that their longitudinal axis is in the driving direction of the tractor and when they are in such a position that their longitudinal axis is perpendicular to the driving direction of the tractor.

Thus, as the bales can be relatively long as compared with their cross-section it is not sufficient to grab the bales merely in their central part as they will then be constantly deformed or broken up as a consequence of their free ends bending in downward direction in the lifting operation. This reasoning is based on the fact that the bales are grabbed from their upper side by penetrating grab means, said bales being left hanging in said grab means when lifted.

One possibility of overcoming the aforesaid problem is to give the bale handling device such a big dimension that the grab means will be able to fix the end portions of the bales

thanks to their geometrical location so that said bale deformation is avoided. The format of such a bale handling device will be big, heavy and awkward to use in limited space.

5 It is the object of this invention to provide an extraordinarily attractive bale handling device by means of which said problems are eliminated when handling oblong bales, and this object is achieved in that the device has been given the characteristic features defined in the claims.

10 The construction of a bale handling device according to the invention is simple and its format is small and it can be very easily shifted between its two positions of use.

15 Illustrated examples of the invention will be described below more in detail with reference to the enclosed drawings, in which Fig. 1 is a top view of the inventive bale handling device in one of its positions of use, Fig. 2 is a top view showing the bale handling device in its other position of use, Fig. 3 is a lateral view of the bale handling device in the position of use according to Fig. 1, Figs. 4 and 5 are front views of the bale handling device in the position of use according to Fig. 1, the grab means in Fig. 4 being in an inactive position and in Fig. 5 in an active one.

20 The bale handling device 1 has attaching means 2 to enable mounting thereof in a suitable lifting and operating device (not shown) supported by a vehicle, e.g. a front loader carried by a tractor. The attaching means 2 are drawn with dot and dash lines in the figures and only show an example of how such attaching means can be designed.

30 The attaching means 2 are connected to a stand 3 comprising arms 4-9. The stand 3 comprises further a shield 10 connected with the arms 4 and 5, the function of which will be explained more closely below. One end of the arms 8 and 9 is connected to the arms 4 and 5, respectively, and their other ends are connected to a vertical bearing sleeve 11 which is a part of the bearing 12 with turning possibilities.

35 The bale handling device 1 comprises further a grab unit 20 rotatably connected with the stand 3 through the bearing 12. The grab unit 20 is built around a supporting beam 21 carrying a number of bearing sleeves 22-27. The bearing sleeves 22-24 support a rotatable rod 28 and the bearing sleeves 25-27 support a rotatable rod 29. The rods 28 and 29 support each a

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number of grab means in the form of a claws 30 accompanying the turning motion of the relative rod around its longitudinal axis. The grab means 30 are preferably relatively sharp in their free end 31 to obtain a good penetrating ability and, moreover, the grab means are preferably bent as is apparent from Figs. 4 and 5.

The supporting beam 21 has a protection against collisions at its front end in the form of a transversal rod 40, the object of which is to prevent damage to the bale handling device in case there is an unintentional collision with some object. The beam 21 supports further a vertical pipe 41, the outer surface of which coacts with an inner surface of the sleeve 11 in the vicinity of the free end of the pipe forming a bearing 12 rotatable about an axis 42. The pipe 41 is axially fixed relative to the sleeve 11. Two stays 43, 44 are arranged between the supporting beam 21 and the pipe 41.

The grab means 30 are arranged rotatably between the inactive position shown in Fig. 4 and the active position shown in Fig. 5. Said turning ability is accomplished by a double-acting hydraulic cylinder 50 adapted to act between the swivel rods 28 and 29, the piston 51 of the hydraulic cylinder 50 being eccentrically and articulatedly connected to the rod 28 and the hydraulic cylinder 50 being eccentrically and articulatedly connected to the rod 29 at its end 52 through a swivel lever 53. The articulated point of connection 54 between the swivel lever 53 and the cylinder 50 is guided, when moved, by a groove 55 in two plates 56, 57 connected to the pipe 41.

The turning operation between the positions of the grab unit 20 relative to the stand 3 shown in Figs. 1 and 2 can be carried out manually, the grab unit 20 being fixed relative to the stand 3 in the desired turning position by means of a locking pin 60. Another alternative for providing said relative turning between the grab unit 20 and the stand 3 is arranging a double-acting hydraulic cylinder 70 so that it will act between an attaching means 71 of the stand 3 and an attaching means 72 of the rotatable grab unit 20. The hydraulic cylinder 70 is indicated by dash lines in Figs. 1, 2 and 5.

The bale handling device 1 thus mounted to a tractor provided with a front loader through the attaching means 2 will operate as follows.

So as to aid in understanding the following functional description two bales have been marked by dot- and -dash lines in the figures, A designating the corners of a bale and B designating the corners of another bale. Moreover, in Figs. 1-3 the normal driving direction of the tractor provided with a front loader has been marked with an arrow C in Figs. 1-3.

When two bales located close to each other are to be moved by means of the bale handling device 1, said device is operated by means of the vehicle so that it will be placed at two bales, as apparent from the figures. It should then be mentioned that the shield 10 can be used as an aid/bulldozer blade when the position of the bales must be adjusted.

When the bale handling device has been moved to the desired position relative to the bales the grab means 30 are operated from the inactive position shown in Fig. 4 to the active position shown in Fig. 5. This is carried out in that the hydraulic cylinder 50 is operated so that the piston rod 51 moves outwards, the tips 31 of the grab means 30 penetrating into the bales and retaining/grabbing these so that the bales will accompany the bale handling device 1 when this is lifted. In connection with the outward motion of the piston 51 the point of attachment 54 will move into the groove 55, as apparent from Figs. 4 and 5. Here it should be mentioned that it is possible, when desired, to obtain a certain delay of the motion of the grab means 30 located to the left in Figs. 4 and 5 relative to the grab means 30 located to the right in the same figures by adjusting the inertia in the movement of the point of attachment 54 in the groove 55. This can for instance be advantageous when it is desired to displace a bale partially and thereafter for instance grab another bale.

When the bales have been moved to the desired final position by means of the bale handling device the bales are detached from the device by actuating the hydraulic cylinder 50 so that the piston rod 51 is moved into this, the grab means returning to the inactive position shown in Fig. 4.

Figs. 1, 3-5 show the bale handling device 1 in one of its working positions and when it is desired to go over to the working position according to Fig. 2 this is done either by manual turning of the grab unit 20 relative to the stand 3 or by remote operation by the aid of the double-acting hydraulic

cylinder 70.

It will be appreciated that the grab unit 20 can be turned relative to the stand 3 even when the grab means 30 are in their inactive position according to Fig. 4. Moreover, thanks to the low placement of the attaching means 2 on the stand 3 lifting height will be gained.

The hydraulic cylinders 50 and 70 will preferably have their hydraulic oil supply from the tractor, but it will be appreciated that the operating means 50 and 70 need not necessarily consist of hydraulic cylinders but of course other operating means can also be used.

Thus, the invention is not restricted to what has been shown and described above, but amendments and modifications thereof are possible within the scope of the appended claims.

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### Claims

1. A device for handling bales and the like, which is intended for mounting on a vehicle and to be supported by this, said vehicle having means for moving the device at least vertically relative to the vehicle, said device comprising  
 5 movable means for grabbing the bales so that these accompany the device when this is moved by means of the vehicle, characterized in that the bale handling device comprises a stand connectable to the vehicle and a  
 10 grab unit supporting the grab means, said grab unit being rotatably connected to the stand so that the grab means can act in more than one direction relative to the stand.

2. The bale handling device of claim 1, characterized in that the rotatable connection between the  
 15 stand and the grab unit comprises a bearing, the axis of rotation of which extends vertically.

3. The bale handling device of claim 1 or 2, characterized in that the grab unit comprises two  
 20 rotatable rods supporting the grab means, said grab means accompanying the turning motion of the rods.

4. The bale handling device of claim 3, characterized in that the rotatable rods are rotatable about each their horizontal axis.

5. The bale handling device of claim 3 or 4, characterized in that a cylinder actuated by pressure medium is arranged to make the rods rotate, the  
 25 piston of said cylinder being articulatedly and eccentrically connected to one rod and the other end thereof being articulatedly and eccentrically connected to the other  
 30 rod through a swivel arm.

6. The bale handling device of claim 5, characterized in that the motion of a connection arranged between the end of the cylinder without piston and the swivel arm  
 35 is guided in a groove.

7. The bale handling device of claims 1-6, characterized in that a cylinder actuated by pressure medium is arranged to act between the stand and the grab unit in order to provide a relative turning between  
 40 the stand and the grab unit.

8. The bale handling device of claims 1-7, c h a r -  
a c t e r i z e d in that the stand comprises a shield  
serving as an aid in straightening the bales relative to  
the bale handling device.

5 9. The bale handling device of claims 1-8, c h a r -  
a c t e r i z e d in that the grab means are bent and  
pointed.

10. A device for handling bales and the like substantially as  
hereinbefore described with reference to the accompanying drawings.